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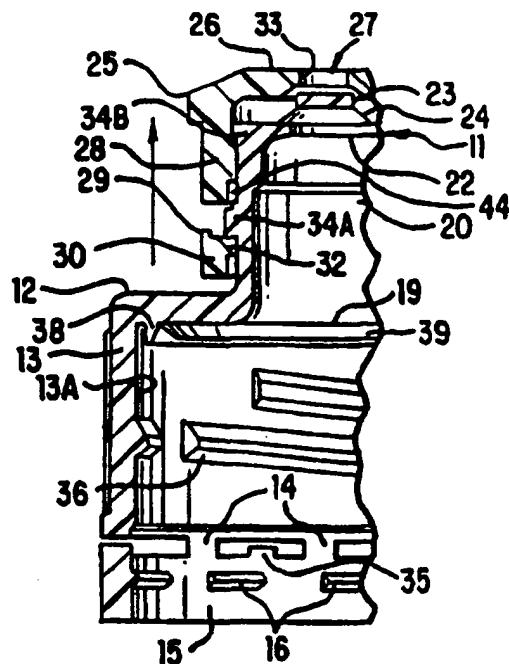
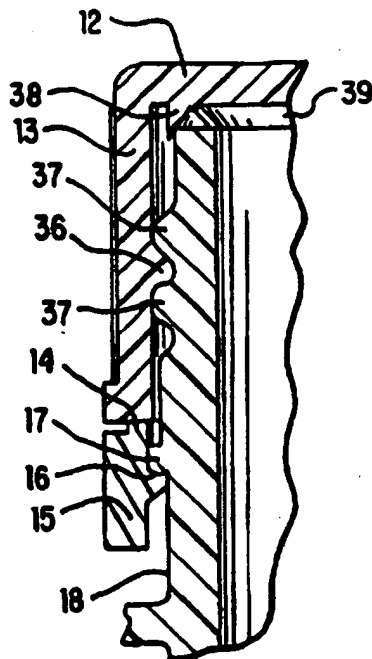
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(54) Title: TAMPER EVIDENT PLASTIC CLOSURE

(57) Abstract

The present invention generally provides a threaded tamper-evident closure having an annular hook-shaped flange (16) extending radially inward from the inner surface of the tamper-evident band (15) attached to the bottom edge of the closure body. The hook-shaped flange can be continuous or segmented and forms an upwardly angled surface for engaging the sealing flange (17) on the bottle neck. A plurality of elevated areas (35) extend upwardly from the tamper-evident band in spaced relation to the bottom edge of the closure body. The frangible elements (14) connecting the tamper-evident band to the lower edge of the closure depending annular flange

may be configured to extend from these elevated areas as well as the non-elevated areas of the tamper-evident band. A second preferred embodiment of the present invention provides a threaded tamper-evident plastic closure having a tamper-evident band containing the above-described features, for use with a tamper-evident push-pull resealable pour spout (20) which is substantially leak proof. The present invention also optionally provides a tamper-evident dust cover (90) which encloses the push-pull pour spout closure when inserted on the container. The dust cover is provided with a ratcheted tamper-evident sealing band (91) which remains intact upon initial installation of the dust cover onto the container and which is broken when the dust cover is initially disturbed.



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TITLE

TAMPER EVIDENT PLASTIC CLOSURE

FIELD OF THE INVENTION

This device generally relates to threaded tamper evident container closures, and to threaded tamper-evident closures having a push-pull resealable tamper evident pour spout.

CROSS-REFERENCE

This application is a continuation-in-part of U.S. Patent Application Serial No. 08/687,149 filed on July 24, 1996, which is a continuation-in-part of U.S. Patent Application Serial No. 08/633,225 filed on April 16, 1996.

BACKGROUND OF THE INVENTION

Examples of threaded prior art tamper-evident closures are disclosed in U.S. Patent Application Serial No. 08/332,589 filed October 31, 1994 which is the priority document for International Patent Application No. PCT/IB95/01174 (published July 11, 1996 under International Publication No. WO 96/20872), U.S. Patent Nos. 4,664,278 and 4,971,212, and in U.K. Patent No. GB 2,177,384 and French Patent No. 2,682,357. Examples of threaded prior art tamper-evident closures having a push-pull resealable tamper-evident pour spout are disclosed, in U.S. Patent Application Serial No. 08/332,140 filed October 31, 1994 which is the priority document for International Patent Application No. PCT/IB95/01105 (published May 9, 1996 under International Publication No. WO 96/13442), and in U.S. Patent Nos. 5,465,876.

The present invention provides an improved means of locking threaded tamper-evident closures to a bottle neck, by means of a uniquely shaped annular flange extending radially inward from the inner surface of the tamper-evident band attached to the bottom edge of the closure body. This flange, which can be continuous or segmented, forms an upwardly angled

"hook" shaped surface for engaging the sealing flange on the bottle neck. The hook-like flange has a reverse basis that allows it to slide past the bottle neck sealing flange as the cap is snapped downward onto the container during installation. The hook-shaped flange then provides a positive grip on the bottle neck sealing flange to prevent removal of the closure while the tamper evident band remains intact. This hook-like sealing feature makes the closure of the present invention more difficult to detach from the container neck than existing prior art designs to minimize the risk of unintended removal while at the same time providing the same ease of installation as found in existing designs. The hook-shaped flange of the present invention can optionally be configured with a plurality of fins or gussets extending upwardly from and in a direction substantially perpendicular to the sealing surface of the flange. The purpose of the fins or gussets is to assist in breaking and dislodging the tamper-evident band from the remainder of the closure by engaging the exterior surface of the bottle neck as the tamper-evident seal is being broken.

Additionally, the present invention provides a novel configuration for protecting the integrity of frangible elements during installation of threaded tamper-evident closures. A plurality of elevated areas extend upwardly from the tamper-evident band in spaced relation to the bottom edge of the closure body. The purpose of these elevated areas is to support the tamper evident band in resisting vertical movement imparted by insertion of the closure on the bottle neck, thereby protecting the frangible elements during assembly. The frangible elements connecting the tamper-evident band to the lower edge of the closure body may be configured to extend from these elevated areas as well as the non-elevated areas of the tamper-evident band. The purpose of attaching frangible elements to the elevated areas of the tamper-evident band is to assist in preventing axial misalignment of the tamper-evident

band relative to the annular depending skirt portion of the closure upon subjecting the closure to torquing forces during assembly to the container neck.

Prior art threaded push-pull pour spout closures providing tamper evidency and having tamper evident pour spouts have not always been leak proof at spout closure interface. Generally, prior art push-pull pour spout closures that are reusable do not provide effective sealing at the juncture between the spout opening and the plug positioned in the opening when the spout is closed. Because of the very small diameter of the opening and the concern for safety, it is not possible to add non-integrated sealing means. The present invention solves this problem by utilizing a closure plug which combines a circular closure disk with an integral annular skirt depending from the periphery of the disk thereby defining a hollow cavity for the plug interior and increasing the structural flexibility of the plug. The increased structural flexibility provided by the hollow cavity causes inward deformation of the plug skirt upon engagement with annular flanges integrated into the periphery of the spout closure central opening to create a form-fitting leak tight seal. A plurality of circumferentially spaced dimples optionally extend from the exterior wall of the pour spout. These dimples engage vertically spaced inturned annular flanges on the interior surface of the spout closure to facilitate breaking the frangible elements connecting the tamper evident band to the push-pull pour spout closure.

The present invention also optionally provides a tamper-evident dust cover which encloses the push-pull pour spout closure when inserted on the container. The dust cover is provided with a tamper-evident sealing band which remains intact upon initial installation of the dust cover onto the container and which is broken when the dust cover is initially disturbed. The purpose of the dust cover is to provide an indication of whether the push-pull pour spout closure has been exposed subsequent to the sealing of the container.

Accordingly, it is an object of the present invention to provide a threaded tamper-evident closure having an annular hook-shaped flange extending radially inward from the inner surface of the tamper-evident band attached to the bottom edge of the closure body, for locking the closure to a bottle neck while the tamper evident band is intact.

It is a further object of the present invention to provide a threaded tamper-evident closure having an annular hook-shaped flange with a plurality of fins or gussets extending upwardly from and in a direction substantially perpendicular to the sealing surface of the flange, to assist in breaking and dislodging the tamper-evident band from the remainder of the closure.

It is a further object of the present invention to provide a threaded tamper-evident closure having frangible elements attached from and between a plurality of elevated areas extending upwardly from the tamper-evident band, for protecting the integrity of frangible elements during installation of the closure on a bottle neck.

It is a further object of the present invention to provide a threaded tamper-evident closure with a reusable push-pull pour spout having a closure plug of increased structural flexibility to provide a more effective leak tight seal.

It is a further object of the present invention to provide a dimple means for facilitating the breakage of frangible elements on the tamper evident band of the push-pull pour spout closure.

It is a further object of the present invention to provide a threaded tamper-evident closure with a reusable push-pull pour spout that utilizes an upwardly angled hook-shaped annular flange to prevent removal of the closure body from a bottle neck while the tamper evident band remains intact.

It is a further object of the present invention to provide a threaded tamper-evident closure with a reusable push-pull pour spout having a plurality of fins or gussets extending upwardly from and in a direction substantially perpendicular to the sealing surface of an annular hook-shaped flange, to assist in breaking and dislodging the tamper-evident band from the remainder of the closure body.

It is a further object of the present invention to provide frangible elements attached from and between a plurality of elevated areas extending upwardly from the tamper-evident band, for protecting the integrity of frangible elements during installation of the closure on a bottle neck.

It is a further object of the present invention to provide a dust cover with a ratcheted tamper-evident sealing band which encloses the push-pull pour spout closure when inserted on the container.

SUMMARY OF THE INVENTION

A first preferred embodiment of the present invention generally provides a threaded tamper-evident closure having an annular hook-shaped flange extending radially inward from the inner surface of the tamper-evident band attached to the bottom edge of the closure body. The hook-shaped flange can be continuous or segmented and forms an upwardly angled surface for engaging the sealing flange on the bottle neck. The edge of the flange preferably lies at an angle with a plane normal to the inner surface of the tamper-evident band, thereby defining a grooved "hook" which slides over the locking flange on the bottle neck when the closure is placed on the container but which engages and locks the closure to the container neck when removal of the closure is attempted with the tamper-evident band intact. The hook-shaped flange can optionally be configured with a plurality of fins or gussets extending upwardly from and in a direction substantially perpendicular to the sealing surface of the

flange. A plurality of elevated areas extend upwardly from the tamper-evident band in spaced relation to the bottom edge of the closure body. The frangible elements connecting the tamper evident band to the lower edge of the closure depending annular flange may be configured to extend from these elevated areas as well as the non-elevated areas of the tamper-evident band.

A second preferred embodiment of the present invention provides a threaded tamper-evident plastic closure having a tamper-evident band containing the above-described features, for use with a tamper evident push-pull resealable pour spout which is substantially leak proof. The push-pull pour spout has an opening which is partially closed by a second top having a secondary opening therein and a plug spaced thereabove with upwardly angled legs formed integrally with the closure. The plug takes the form of a circular closure disk having an integral annular skirt depending from the periphery of the disk that attaches the plug to the angular legs thereby defining a hollow cavity for the plug interior and increasing the structural flexibility of the plug. Integrated into the periphery of the secondary opening is at least one and preferably two annular flanges which engage the plug skirt when the secondary opening is closed to seal the spout. The annular flanges cause inward deformation of the plug skirt upon engagement to create a form-fitting leak proof seal. A plurality of circumferentially spaced dimples optionally extend from the exterior wall of the pour spout. These dimples engage vertically spaced intumed annular flanges on the interior surface of the spout closure to facilitate breaking the frangible elements connecting the tamper evident band to the spout closure. The present invention also optionally provides a tamper-evident dust cover which encloses the push-pull pour spout closure when inserted on the container. The dust cover is provided with a ratcheted tamper-evident sealing band which remains intact

upon initial installation of the dust cover onto the container and which is broken when the dust cover is initially disturbed.

Other advantages of the present invention will become apparent from a perusal of the following detailed description of a presently preferred embodiment taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figures 1 and 1A are sectional views of a threaded tamper-evident closure of the present invention.

Figures 2 and 2A are perspective views of a threaded tamper-evident closure of the present invention;

Figures 3 and 3A are enlarged sectional views of the tamper-evident band of the closure of the present invention;

Figures 4 and 4A are bottom plan views of the closure of the present invention;

Figure 5 is an enlarged partial cross-sectional view of the closure of the present invention as installed on a container neck.

Figure 6 is an exploded view of the hook-shaped locking flange of the present invention.

Figure 6A is an exploded view of the hook-shaped locking flange of the present invention displaying a plurality of fins or gussets.

Figure 6B is an exploded view of the hook-shaped locking flange of the present invention positioned adjacent to the bottom edge of the closure tamper-evident band and having and having a surface substantially parallel to the interior surface of the closure tamper-evident band.

Figure 7 is a vertical cross-section through a portion of a resealable push-pull pour spout closure with the push-pull cap in an open position;

Figure 7A is a vertical cross-section through a portion of the resealable push-pull pour spout closure with the push-pull cap in a closed position;

Figure 8 is a perspective view of the resealable push-pull pour spout closure;

Figure 8A is a sectional view of the resealable push-pull pour spout closure with tamper evident dust cover installed;

Figure 9 is a perspective view of a portion of the push-pull cap;

Figure 9A is a top plan view of the push-pull cap;

Figure 10 is an enlarged partial section view of the secondary opening of the push-pull cap;

Figure 10A is an exploded view of the secondary closure plug of the present invention.

Figure 11 is an exploded view of the resealable push-pull pour spout closure with tamper evident dust cover installed.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

Referring to Figures 1-6 and 1A-6A of the drawings, a first preferred embodiment of a plastic threaded tamper-evident closure is shown having a seal disc **12** and a depending annular skirt **13** extending therefrom. The depending annular skirt **13** has inwardly extending spiral threads **36** formed on its interior annular surface **13A** which can be either continuous as shown in Figure 1 or segmented as shown in Figure 1A. If segmented, threads **36** segments may be offset or aligned in spaced vertical relation to one another defining spaced parallel threaded segment pairs as shown in Figure 1A. A frangible annular tamper-evident band **15** is integrally molded to annular skirt **13** by interconnecting frangible elements **14** and

14A. The tamper-evident band 15 is flexible for initial insertion of the closure on the neck portion 18 of the container as will be understood by those skilled in the art.

Referring to Figures 1, 1A, 4 and 4A of the drawings, arcuate hook-like flanged locking projections 16 are circumferentially spaced about the inner surface of said tamper evident ring 15 and are positioned so that they are engageable under an annular locking flange 17 to lock the closure on a bottle neck 18 as seen in Figure 5 of the drawings. As can be seen in Figure 6, projections 16 comprise edges 16a defining grooves 16b formed on radially upwardly extending annular flanges 16c. Flanges 16c are preferably discontinuous but can be continuous. Edge 16a and groove 16b provide a "hook" shape for engaging the annular locking flange 17 which has a radius substantially the same as groove 16b. The surface of flange 16c lies at an angle with a plane normal to the inner surface of the tamper-evident band 15, thereby defining a grooved "hook" with a reverse basis allowing flange 16c to slide over the locking flange 17 on the bottle neck 18 when the closure is placed on the container but which engages and locks the closure to the container when removal of the closure is attempted with the tamper-evident band 15 intact. As shown in Figure 6B, the aforementioned angle may vary over the surface of flange 16c such that at least a portion of the flange surface lies substantially parallel to the interior surface of the tamper indicating band 15. This flanged edge and groove configuration 16a-16c may be positioned at any elevation the surface of tamper-evident band 15, including a position adjacent to the bottom edge of tamper-evident band 15 as shown in Figure 6B. Because groove 16b is undercut, a mold core must be used that frees or permits removal of undercut prior to stripping the closures from the mold. Various techniques are known to those skilled in the art including the use of movable core sleeves which free the undercut section of the mold. As shown in Figures 6A and 6B, the hook-shaped flange 16c of the present invention can optionally be

configured with a plurality of fins or gussets **10** extending upwardly from and in a direction substantially perpendicular to the sealing surface of the flange. The purpose of the fins or gussets **10** is to assist in breaking and dislodging the tamper-evident band from the remainder of the closure by engaging the exterior surface of the bottle neck as the tamper-evident seal is being broken.

Referring to Figures 1-1A, 2-2A and 3-3A, it will be seen that the tamper-evident band **15** has a series of circumferentially spaced elevated bridge areas **35** extending towards the closure depending annular skirt **13**. Each of the elevated bridge areas **35** defines a reinforcing support for the tamper-evident band **15** during molding and insertion of the closure on the bottle neck. As shown in Figures 1A, 2A and 3A, frangible elements **14** can be configured to extend from the tamper evident band **15** between the elevated bridge areas **35**. Alternately, as shown in Figures 1, 2 and 3, frangible elements **14A** can be configured to extend from the tops of the elevated bridge areas **35** to the tamper evident band **15** in addition to the frangible elements **14** which are located between the elevated bridge areas **35**. Arcuate projections **16** are shown in Figures 1A-4A in a vertically aligned relation with the respective elevated bridge areas **35** with frangible elements **14** therebetween, but projections **16** can be offset with respect to both the elevated bridge areas **35** and the frangible elements **14** or **14a**, as shown in Figures 1-4.

Each of the bridge areas **35** provides support for the tamper-evident band **15** during the closure capping process on the bottle neck portion by preventing excessive vertical deformation and movement of the ring against the depending skirt **13** which would otherwise break the frangible elements **14** prematurely, since the elevated bridges **35** act as stops against the depending closure skirt **13**. The same protection of the tamper-evident band **15** is apparent during molding of the closure at a time when the frangible elements **14** can be

readily damaged when stripped from the mold. The purpose of attaching frangible elements **14A** to the elevated bridge areas **35** of the tamper-evident band **15** is to assist in preventing axial misalignment of the tamper-evident band **15** relative to the closure annular depending skirt **13** upon subjecting the closure to torquing forces during assembly to the container neck **18**.

As can be seen in Figure 5, the closure spiral thread **36** engages a registering-spiral thread **37** extending outwardly from the container neck portion **18** a known distance. The resulting action of the closure rotation for removal twists and elevates the closure on the neck portion deforming and breaking the respective frangible elements **14** and **14A** separating the tamper-evident band **15** from the depending annular skirt **13**. By referring to Figure 4A, the closure can be seen wherein the relative positioning of the segmented spiral thread **36** and the arcuate projections **16** on the tamper-evident band **15** can be seen in a circumferentially spaced overlapping relationship providing for offsetting points of engagement with respect to registering locking annular flange **17** and spiral thread **37** on the container neck **18**, respectively.

Figures 7 and 7A provide the second preferred embodiment of the invention showing a resealable push-pull pour spout closure. The closure is preferably made of high density polyethylene which also is made of high density polyethylene, except for pour spout **20** which is preferably low density polypropylene. As shown in Figures 7-7A and 8-8A The portion of the closure extending below seal disc **12** can be configured in accordance with any of the embodiments shown in Figures 1-6 and 1A-6A as described above.

Referring to Figures 7 and 7A, an opening **19** is preferably formed in the center of seal disc **12** with an upstanding cylindrical pour spout **20** positioned in registry with opening **19**. The upper end of the pour spout **20** includes a secondary top portion **21** which is

apertured at 22. A closure plug 23 is positioned on the secondary top portion 21 in spaced relation to aperture 22 by a plurality of circumferentially spaced angularly arranged upwardly extending supports 24. A push-pull cap 25 is positioned on the upstanding cylindrical pour spout 20 and has a top surface 26 with a central opening 27 which is designed to register with the plug 23 to form a secondary closure when the push-pull cap 25 is in a closed position resting on the secondary top portion 21 of the upstanding cylindrical pour spout 20, as illustrated in Figure 7A.

Referring to Figure 10A, the plug 23 is formed by a circular closure disk 41 having an integrally molded annular skirt 42 depending from the periphery of the disk 41. The sidewall of skirt 42 is dimensioned to be thin enough to allow inward deformation of the sidewall upon contact with the central opening surface 27 of spout cap 25 while at the same time being thick enough to ensure that the plug 23 will not break off with repeated use. Skirt 42 attaches plug 23 to the angular supports 24 thereby defining a hollow cavity 43 for the plug interior.

Located on the inner surface of central opening 27 is at least one, but preferably a pair of annular, preferably arcuate, flanges 33 which radially project into opening 27. As shown in Figure 10, a pair of annular flanges 33a and 33b are integrally molded with the inner surface of central opening 27. A pair of flanges 33a and 33b are especially preferable for sealing fluids such as water. However, a single flange is sufficient for containers used for fluids having a higher viscosity such as fruit juice. The radially projecting flanges 33 engage depending plug skirt 42 to form a leak tight seal for the spout 20. The attachment of skirt 42 to the periphery of disk 41 increases the structural flexibility of the plug 23 thereby forcing the plug skirt 42 to flex and inwardly deform upon engagement with radially projecting flanges 33. This deformation causes a form fit which increases the tightness of

the secondary closure seal thereby resulting in a superior leak-tight arrangement when compared to other designs currently in the state of the art.

Push-pull cap 25 has a depending cylindrical body member 28 with a plurality of annularly spaced frangible elements 29 connected on its lower perimeter edge to a secondary tamper indicating band 30. The cylindrical body member 28 has a pair of vertically spaced inturned annular flanges 31 which slidably engage the outer surface of the upstanding cylindrical pour spout 20. The secondary tamper-evident band 30 also has an internal annular flange 32 which is slidably engaged at the exterior of the upstanding cylindrical pour spout 20. The upstanding cylindrical pour spout 20 has two outwardly extending annular flanges 34a and 34b, respectively on the exterior thereof. The internal annular flange 32 is oppositely disposed with respect to the secondary top portion 21 and outwardly extending flange 34a. The outwardly extending flange 34a is positioned above the seal disc 12 and is oppositely disposed to and between the annular flanges 31 and 32 on the cylindrical body member 28 and the secondary tamper evident band 30, respectively. As shown in Figures 8A and 9, the secondary-tamper evident band 30 may contain elevated bridge portions 29A extending from and between frangible elements 29, similar to and for the same purpose as the configuration shown on the bottom tamper-evident band 15 shown in Figures 2, 2A, 3 and 3A.

In assembled form as illustrated in Figures 7-7A and 8-8A, the secondary tamper evident band 30 is joined by the frangible elements 29 to the cylindrical body member 28. The push-pull cap 25 is incapable of moving upwardly due to the interengagement of the internal annular flange 32 with the outwardly extending flange 34a on the cylindrical pour spout 20. Thus the cylindrical body member 28 of the push-pull cap 25 is incapable of vertical movement such as required to move the apertured top surface 26 above the plug 23

until sufficient force is applied to the push-pull cap 25 to break away the frangible elements 29 whereby the push-pull cap 25 can move to the position illustrated in Figure 1 of the drawings wherein the opening 27 therein moves upwardly and away from the plug 23. The inturned annular flanges 31 on the cylindrical body member 28 cannot move above the outwardly extending annular flange 34b on the upstanding cylindrical pour spout 20 so that the push-pull cap 25 cannot be removed therefrom.

As shown in Figures 7 and 9A, a plurality of circumferentially spaced dimples 44 optionally extend from the exterior wall of the pour spout 20. Dimples 44 engage the inturned annular flanges 31 on the cylindrical body member 28 of the push-pull spout closure 25 to facilitate breaking the frangible elements 29 connecting the tamper evident band 30 to the spout closure 25. Dimples 44 can break the frangible elements 29 by either axial or rotational movement of the spout closure 25 relative to the pour spout 7. Referring to Figure 8, the push-pull pour spout closure 10 may be seen in assembled condition illustrating an outside rib surface 40 on the depending annular flange 13.

As shown in Figures 8A and 11, the present invention also optionally provides a tamper-evident dust cover 90 which encloses the push-pull pour spout closure when inserted on the container. The dust cover 90 may be optionally provided with an integral ratcheted tamper-evident sealing band 91 which engages teeth 91a integrally formed on the top of closure seal disc 12. Alternately, dust cover 90 may be provided with a tamper-evident sealing band containing at least one bead for engaging at least one bead integrally formed on the top of closure seal disc 12, wherein said beads may be either continuous or discontinuous around their circumference. Tamper-evident sealing band 91 remains intact upon initial installation of the dust cover 90 onto the container. Dust cover 90 and tamper-evident band 91 are separated by the breaking of a line of weakness 92 formed at the intersection of the

dust cover **90** and tamper-evident band **91**. The purpose of the dust cover is to provide an indication of whether the push-pull pour spout closure has been exposed subsequent to the sealing of the container.

While presently preferred embodiments of the invention have been shown and described in particularity, the invention may be otherwise embodied within the scope of the appended claims.

WHAT IS CLAIMED IS:

1. A tamper indicating closure comprising a top portion, an annular depending skirt extending therefrom, a first tamper indicating ring connected to said depending skirt by at least one circumferential first frangible element, said first tamper indicating ring including at least one arcuate projection extending around at least a portion of said first tamper indicating ring arranged for registration with an annular locking flange on a container neck portion on which said closure is positioned, said depending skirt having at least one internal thread for engaging at least one external thread on the neck portion of said container, wherein the improvement comprises:

said at least one arcuate projection comprising a locking member extending radially inward from said first tamper indicating ring at an angle to a plane normal with said first tamper indicating ring.

2. The tamper indicating closure of Claim 1, wherein said locking member comprises a flange having an edge and a groove.

3. The tamper indicating closure of Claim 1, wherein said first tamper indicating ring is connected in vertical spaced relation to said depending skirt by a plurality of circumferentially spaced first frangible elements.

4. The tamper indicating closure of Claim 3, wherein said first tamper indicating ring includes a plurality of annularly spaced first elevated bridge portions extending axially towards said depending skirt, wherein said first elevated bridge portions define areas of decreased ring spacing from said depending skirt.

5. The tamper indicating closure of Claim 4, wherein said first frangible elements are connected to said depending skirt between said first elevated bridge portions.

6. The tamper indicating closure of Claim 4, wherein said first frangible elements are connected to said depending skirt from and between said first elevated bridge portions.
7. The tamper indicating closure of Claim 1, wherein said first tamper indicating ring includes a plurality of said arcuate projections arranged for registration with said annular locking flange on said container neck.
8. The tamper indicating closure of Claim 1, wherein said locking member is continuous.
9. The tamper indicating closure of Claim 1, wherein said locking member is discontinuous.
10. The tamper indicating closure of Claim 4, wherein said first tamper indicating ring includes a plurality of said arcuate projections arranged for registration with said annular locking flange on said container neck and wherein each of said arcuate projections are circumferentially aligned in vertical spaced relation to said first elevated bridge portions of said first tamper indicating ring.
11. The tamper indicating closure of Claim 1, wherein said at least one internal thread on said depending skirt comprises segments.
12. The tamper indicating closure of Claim 11, wherein said segments are in spaced vertical alignment with one another.
13. The tamper indicating closure of Claim 11, wherein said first tamper indicating ring includes a plurality of said arcuate projections arranged for registration with said annular locking flange on said container neck which are in overlapping annular offset alignment with said segments on said depending skirt.
14. The tamper indicating closure of Claim 4 wherein said first elevated bridge portions extending from said annular ring are of a known vertical height, and said first

frangible elements are of a height greater than that of said known height of said first elevated bridge portions.

15. The tamper indicating closure of Claim 1, wherein said locking member further comprises a plurality of gussets extending upwardly from and in a direction substantially perpendicular to the sealing surface of said locking member to assist in dislodging said first tamper indicating ring from the remainder of said closure.

16. The tamper indicating closure of Claim 1, further comprising a resealable push-pull pour spout closure assembly extending from said top portion of said closure, said push-pull pour spout closure assembly comprising:

A. a spout member defining a spout opening and having positioned in spaced relationship thereto a plug with at least one support member defining said relationship;

B. a slidable secondary closure member having a central opening therethrough for cooperation with said plug the improvement therein comprising said central opening having a diameter substantially the same as that of said plug, said central opening being defined by an inner surface having at least one annular seal flange projecting radially into said central opening for engagement with said plug.

17. The tamper indicating closure of Claim 16 wherein said secondary closure member further comprises an annular wall depending from the periphery of said secondary closure member having at least one internally extending annular flange being spaced a distance from said secondary closure member greater than the length of the inner surface of said central opening to permit said secondary closure member to slide and disengage said plug to permit a fluid to pass through said central opening.

18. The tamper indicating closure of Claim 17, wherein said spout member includes an external flange for engaging said internally extending annular flange to inhibit removal of said secondary closure member.

19. The tamper indicating closure of Claim 16, wherein said central opening of said secondary closure member includes at least one said annular seal flanges.

20. The tamper indicating closure of Claim 16, wherein at least one said annular seal flange is continuous.

21. The tamper indicating closure of Claim 16, wherein at least one said annular seal flange is discontinuous.

22. The tamper indicating closure of Claim 16, wherein said plug comprises a circular disk and an integral depending annular skirt extending from the periphery of said disk to attach said disk to said support member thereby defining a hollow cavity within said plug.

23. The tamper indicating closure of Claim 17, further comprising a second tamper indicating ring connected to said annular wall.

24. The tamper indicating closure of Claim 23, wherein said second tamper indicating ring is connected in vertical spaced relation to said annular wall by a plurality of circumferentially spaced second frangible elements.

25. The tamper indicating closure of Claim 24, wherein said second tamper indicating ring includes a plurality of annularly spaced second elevated bridge portions extending axially towards said annular wall, wherein said second elevated bridge portions define areas of decreased ring spacing from said annular wall.

26. The tamper indicating closure of Claim 25, wherein said second frangible elements are connected to said annular wall between said second elevated bridge portions.

27. The tamper indicating closure of Claim 25 wherein said second elevated bridge portions extending from said annular ring are of a known vertical height, and said second frangible elements are of a height greater than that of said known height of said second elevated bridge portions.

28. The tamper indicating closure of Claim 25, wherein said second frangible elements are connected to said annular wall from and between said second elevated bridge portions.

29. The tamper indicating closure of Claim 23, further comprising a plurality of circumferentially spaced dimples extending from said spout member.

30. The tamper indicating closure of Claim 23, wherein said dimples are spaced equally around the circumference of said spout member.

31. The tamper indicating closure of Claim 16, further comprising a cover attached to said top portion of said closure for enclosing said push-pull pour spout closure assembly.

32. The tamper indicating closure of Claim 31, wherein said cover is attached to said top portion of said closure by a third tamper indicating ring.

33. The tamper indicating closure of Claim 32, wherein said third tamper indicating ring includes ratcheted teeth for engaging ratcheted teeth positioned on said top portion of said closure.

34. The tamper indicating closure of Claim 32, wherein said third tamper indicating ring includes an annular bead for engaging an annular bead positioned on said top portion of said closure.

35. The tamper indicating closure of Claim 34, wherein at least one of said annular beads is continuous.

36. The tamper indicating closure of Claim 35, wherein at least one of said annular beads is discontinuous.

37. The tamper indicating closure of Claim 1, wherein said locking member is positioned adjacent to the bottom surface of said tamper indicating band.

38. The tamper indicating closure of Claim 2, wherein at least a portion of the surface of said flange lies substantially parallel to the interior surface of said tamper indicating band.

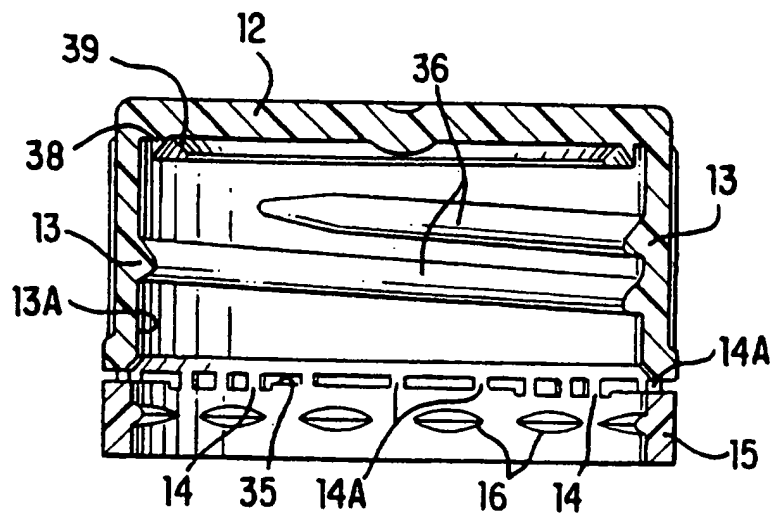


FIG. 1

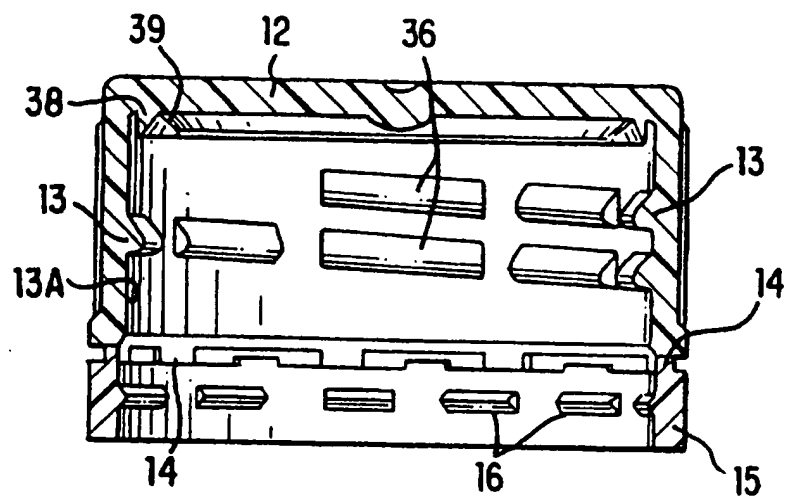


FIG. 1A

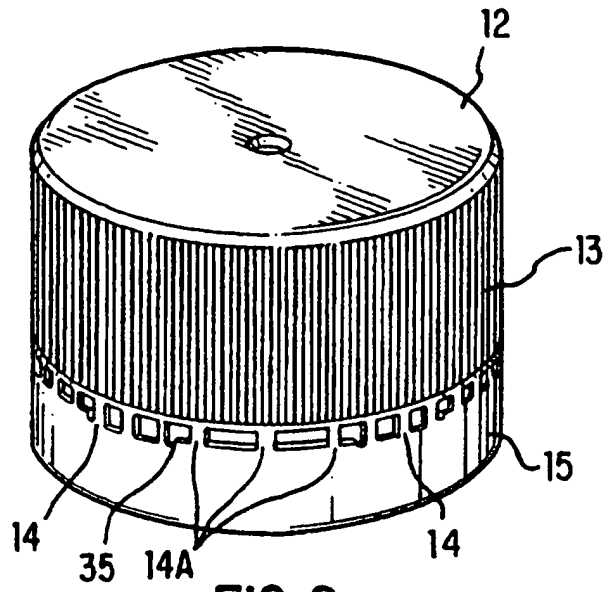


FIG. 2

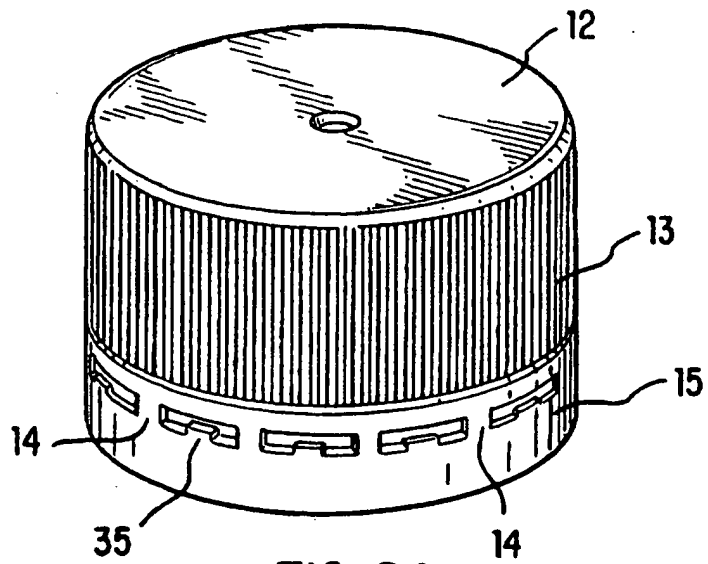


FIG. 2A

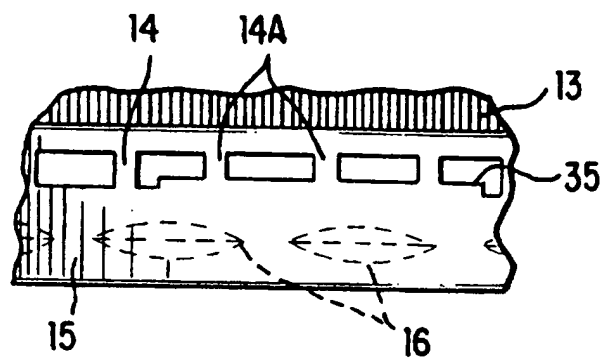


FIG. 3

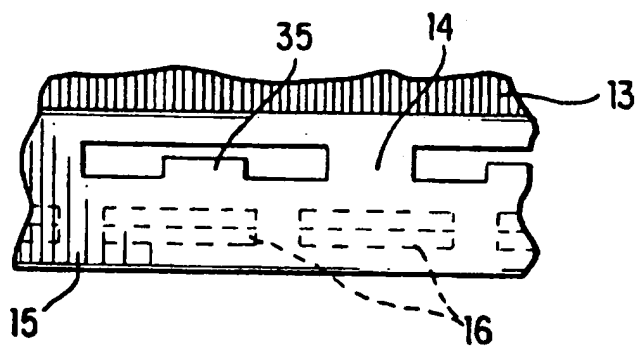


FIG. 3A

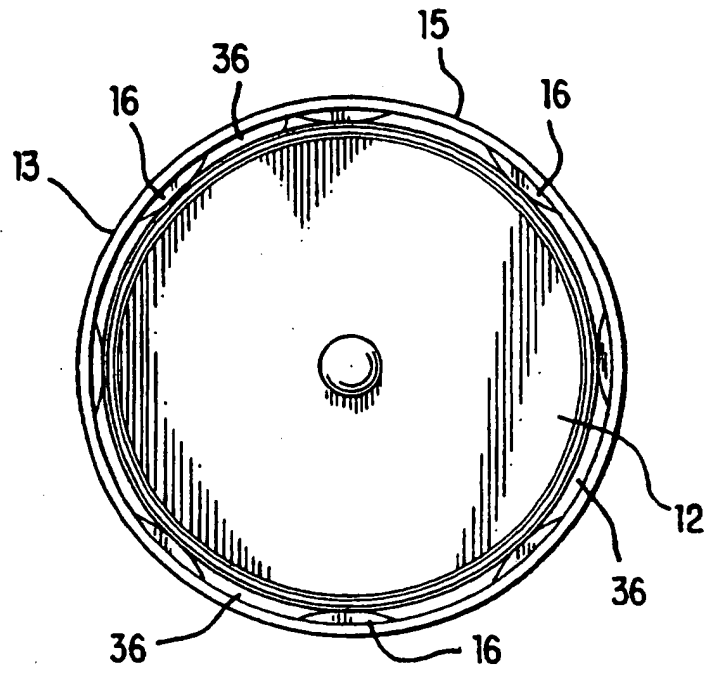


FIG. 4

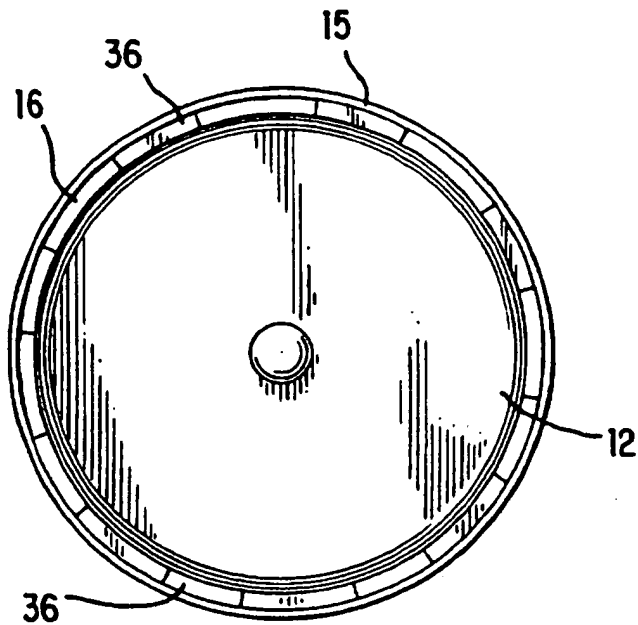


FIG. 4A

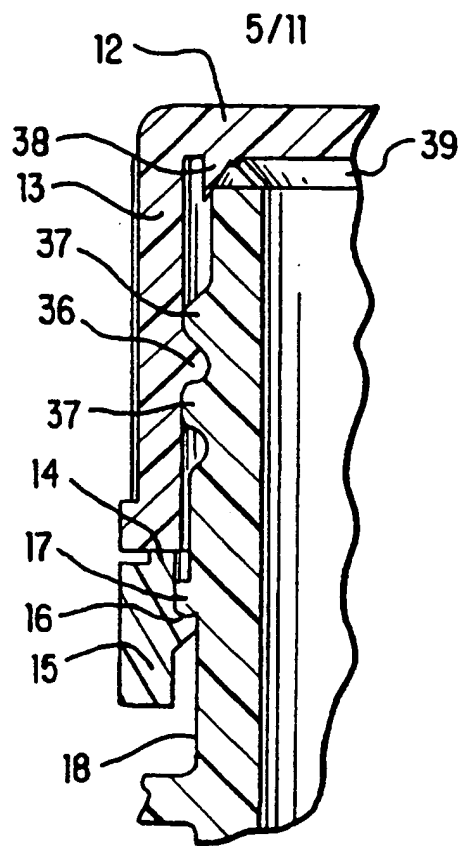


FIG. 5

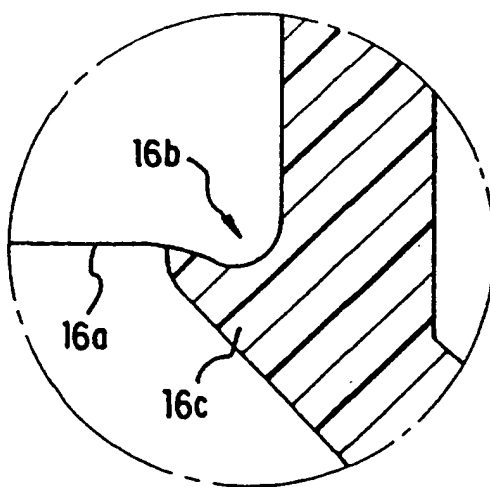


FIG. 6

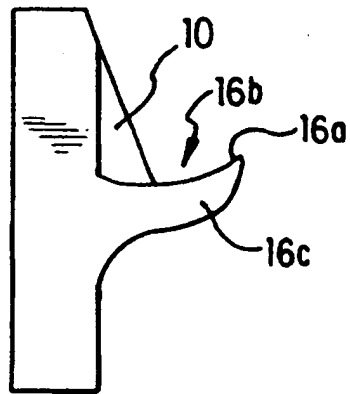


FIG. 6A

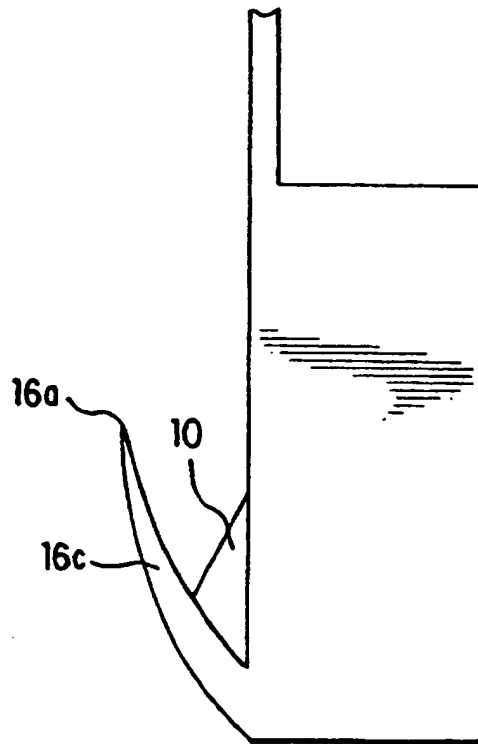


FIG. 6B

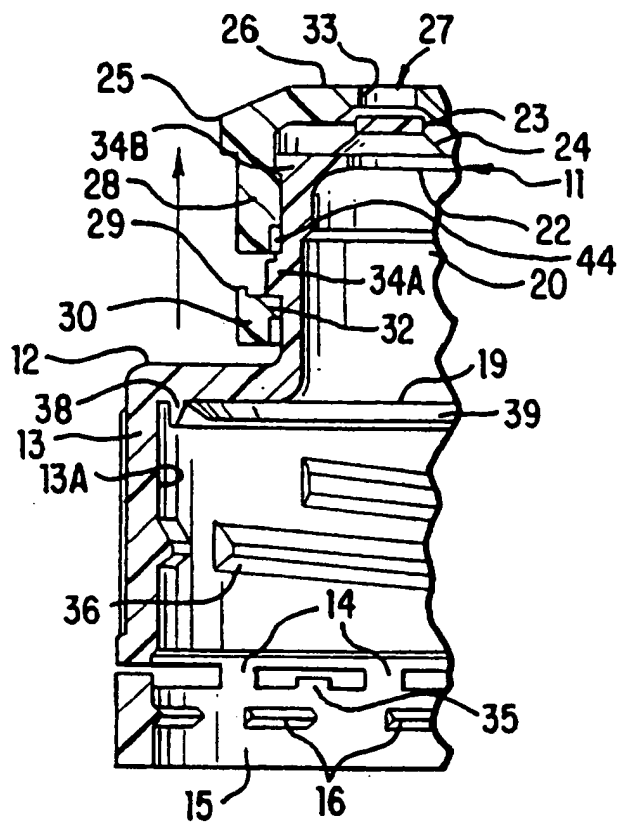


FIG. 7

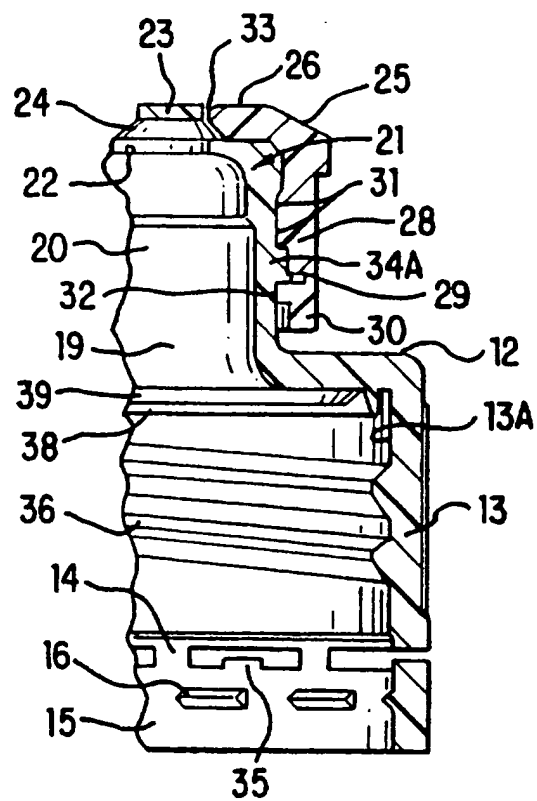


FIG. 7A

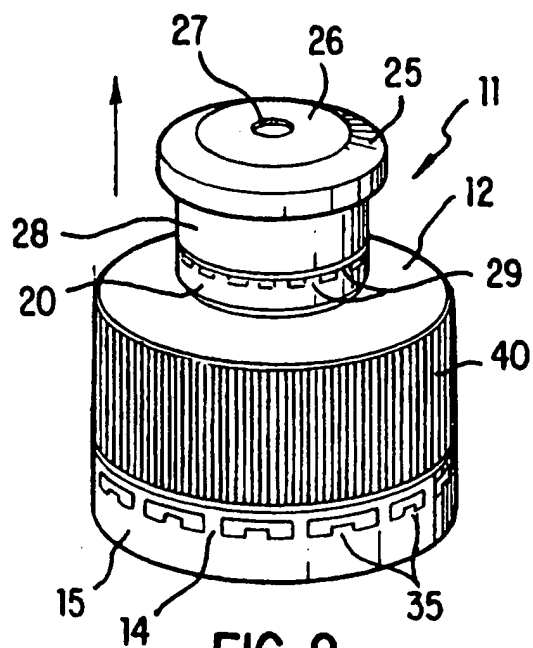


FIG. 8

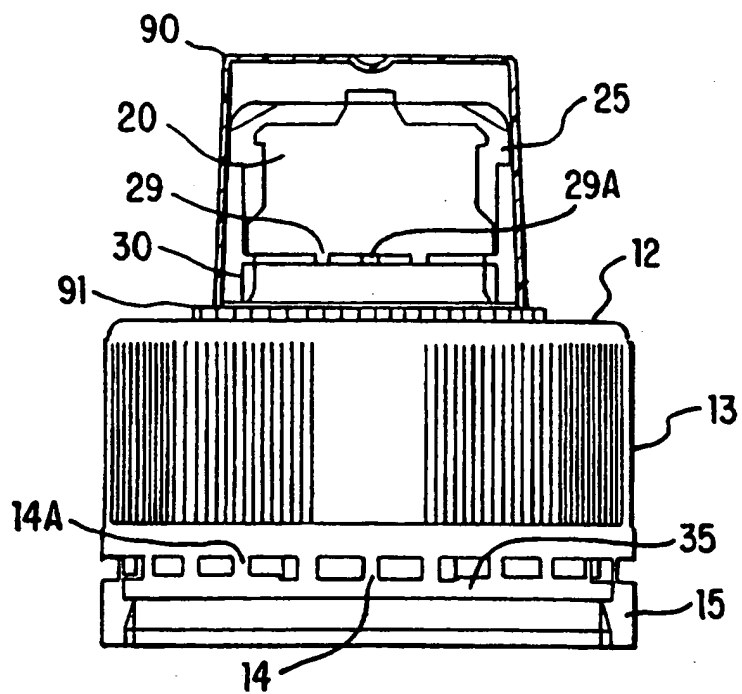


FIG. 8A

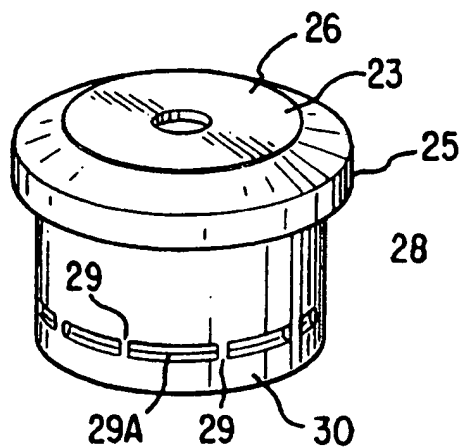


FIG. 9

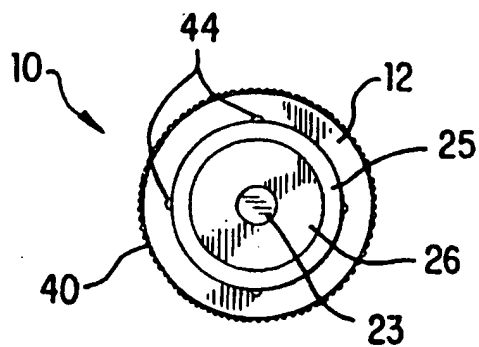


FIG. 9A

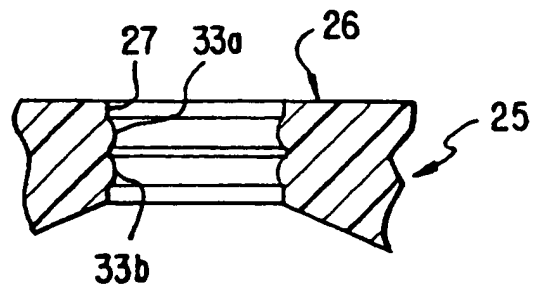


FIG. 10

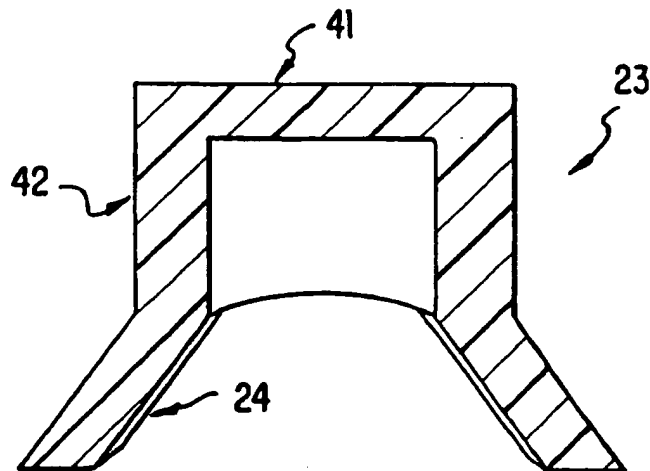


FIG. 10A

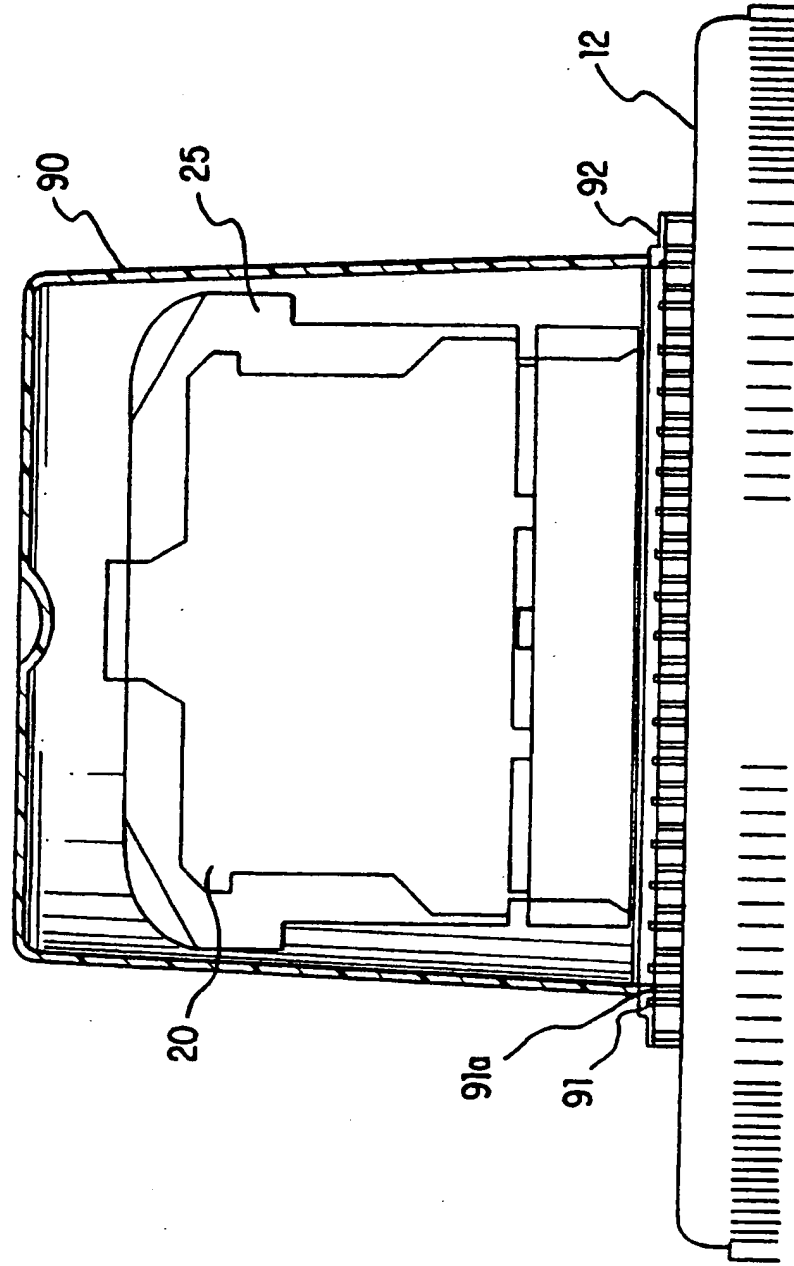


FIG. 11